NASA AGENCY
PEP OCCUPATIONAL SAFETY AND HEALTH SURVEY
FY 2003 ANNUAL RESULTS

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BACKGROUND

I. Introduction

During fiscal year 2003, NASA conducted the Performance Evaluation Profile (PEP) survey of its Occupational Safety and Health program. Included in this report are the civil service data for the NASA Centers that participated in the 2003 survey.

PEP Survey Participants	Number of Participants
Civil service managers	708
Civil service employees	5,461
Contractor personnel	7,035
Total	13,204

This report presents the overall results of this FY03 survey effort for civil service employees and civil service managers only. Not included in this report is the evaluation of anonymous civil service personnel comments. The comments are referenced in each NASA Center level PEP data results report.

II. Occupational Safety and Health Administration (OSHA) Voluntary Protection Program (VPP) and NASA Agency Safety Initiative (ASI)

"OSHA established the Voluntary Protection Programs (VPP) to recognize and promote effective worksite-based safety and health management systems. In the VPP, management, labor, and OSHA establish cooperative relationships at workplaces that have implemented comprehensive safety and health management systems. Approval into VPP is OSHA's official recognition of the outstanding efforts of employers and employees who have created exemplary worksite safety and health management systems." [OSHA TED 8.4, "Voluntary Protection Programs (VPP): Policies and Procedures Manual"]

NASA established the ASI program to become the nation's leader in safety and occupational health and in the safety of the products and services it provides. To achieve the program's goal, NASA categorized four Core Process Requirements (CPR's):

- Management commitment and employee involvement

- System and worksite hazard analysis
- Hazard prevention and control
- Safety and health training

III. PEP Survey VPP Element Descriptions

The PEP survey consists of various OSHA safety and health categories that are termed 'elements'. The VPP elements addressed in the survey are listed below utilizing the descriptions present in the survey form.

Management: Visible management leadership provides the motivating force for an effective safety and health program.

Employee participation: Employee participation provides the means through which workers identify hazards, recommend and monitor hazard abatement, and otherwise participate in their own safety and health program.

Implementation: Management provides implementation tools which include: budget, information, personnel, assigned responsibility, adequate expertise and authority, means to hold responsible persons accountable (line accountability), program review procedures, directives, and methods criteria analysis.

Survey and hazard analysis: An effective safety and health program will seek to identify and analyze all hazards. In large or complex workplaces, components of such analysis are the comprehensive survey and analyses of job hazards and changes in condition.

Inspection: An effective safety and health program will include regular site inspections to identify new or previously missed hazards and failures in hazard controls.

Reporting: A reliable hazard reporting system enables employees, without fear of reprisal, to notify management of condition(s) that appear hazardous and to receive timely and appropriate response.

Mishap investigation: An effective safety program will provide for investigation of mishaps and close calls incidents, so that their causes, and the means for their prevention, are identified.

Data analysis: An effective program will analyze injury and illness records for indications of sources and locations of hazards, and identify jobs that experience higher number of injuries. By analyzing injury

and illness trends over time, patterns with common causes can be identified and prevented.

Hazard control: Workforce exposure to all current and potential hazards should be prevented or controlled by using engineering controls, work practices, administrative controls, and personal protective equipment (PPE).

Maintenance: An effective safety and health program will provide for facility and equipment maintenance, so that hazardous breakdown is prevented.

Medical: An effective safety and health program will include a suitable medical program appropriate for the size and nature of the workplace and its hazards.

Emergency preparedness: There should be appropriate planning, training/drills, and equipment for response to emergencies.

First aid: First aid/emergency care should be readily available for any injury or illness.

Training: Safety and training should cover the safety and health responsibilities of all personnel who work at the site or affect its operation.

IV. PEP Survey Rating System Explanation (figure 1)

The PEP rating system uses a 1 - 5 numeric score for each VPP element, category, and overall safety program, with 5 being the highest rate possible. The definition of each rate is described in figure 1.

V. PEP Scores vs. Program Effectiveness (figure 2)

The safety program effectiveness level, as a function of the PEP rate, is shown in Figure 2. Utilizing a numerical 1-5 rating system, (established internally by NASA), PEP survey results are analyzed to establish their compliance with OSHA VPP certification requirements. These numerical values are based upon personnel's perception of the existing safety and health programs as given by their survey responses. The PEP survey ratings scale is designed to reflect likely OSHA certification awards based upon past awards received. The following thresholds are based on the data shown in figure 2.

- The minimum PEP survey rate that is acceptable is 3.0.
- A PEP survey rate between 3 - 3.5 is a NASA classified 'basic program'.
  -The basic program represents the minimal acceptable compliance level for applying for VPP certification.
- A PEP rate between 3.5 - 4.3 is a NASA classified 'superior program', which may qualify for the OSHA VPP Merit Program.
  -The Merit Program recognizes worksites that have good safety and health management systems and that show the willingness, commitment, and ability to achieve site-specific goals that will qualify them for Star participation.
- A PEP rate between 4.3 - 5.0 is a NASA classified 'outstanding program', which may qualify for the OSHA VPP Star Program.
  -The Star Program recognizes the safety and health excellence of worksites where workers are successfully protected from fatality, injury, and illness by the implementation of comprehensive and effective workplace safety and health management systems. These worksites are self-sufficient in identifying and controlling workplace hazards.

PEP SURVEY RESULTS AND ASSOCIATED GRAPHS

VI. NASA Agency Civil Service Employee and Manager PEP Survey Rates For VPP Elements, Benchmark Comparative Analysis (figures 3 & 4)

The PEP Survey was initially fully implemented agency-wide in 1999; therefore, this report compares the survey results from 1999 through 2003 for a 5-year comparison. Benchmark Comparative Analyses of the Employee and Manager survey results are shown in Figure 3 and Figure 4. Figures 3 and 4 show the combined Center rate averages for the elements since 1999. The survey results are illustrated for each of the survey VPP elements independently.

- In FY-03, Employee rates exhibited their first *unfavorable decrease* in all of the survey elements since 1999.
- The Employee perception of the survey elements has *unfavorably decreased* since 2002 by a 2 - 8% margin.
- The Employees have continually rated the survey element, 'Data Analysis', the lowest of all survey elements over the past 5-years.
- The Employee perception of survey elements has been above the 3.0 minimum acceptable level since 2001.
- In FY-03, Manager rates exhibited their first *unfavorable decrease* in all of the survey elements since 1999.

- The Manager perception of the survey elements has *unfavorably decreased* since 2002 by a 2 - 5% margin.
- The Manager perception of the VPP elements has been above the 3.0 minimum acceptable level since 2000.

VII. FY-03 NASA Agency Civil Service Employee and Manager PEP Survey Rates For VPP Elements, Comparison (figure 5)

The Employee and Manager PEP rates independently measure the perception of the employees and managers of the Safety and Health program(s), as shown in Figure 5. A difference of 1.0 or greater may indicate a difference in perception between Managers and Employees.

- For the survey elements, the employee and manager average ratings differed by 0 - 0.5 margin in 2003.
- No survey element differed by a value greater than 0.5, indicating consistent perceptions of NASA's safety and health program.

VIII. Civil Service Employee and Manager PEP Survey Rates For Each Reporting NASA Center, 5-years (figures 6 & 7)

The total average PEP survey ratings for Employees and Managers at the seven NASA Centers that participated in the PEP survey are shown in Figures 6 and 7 from 1999 to 2003, respectively.

- In FY-03, only one Center (WSTF) shows an *unfavorable decrease* in Employee rating by 0.3 from the 2002 survey.
- The Employee rates have *favorably increased* or remained consistent for three Centers that participated consistently since 1991 (ARC, JSC, and MSFC).
- In FY-03, only one Center (HQ) shows *an unfavorable decrease* in Manager rating by 0.2 from the last recorded survey in 2001.
- The Manager rates have *favorably increased* or remained consistent for three Centers that participated consistently since 1991 (ARC, JSC, and MSFC).

IX. FY-03 Civil Service Employee and Manager PEP Survey Rates For Each Reporting NASA Center (figure 8)

The Employee and Manager PEP rates independently measure the perception of the employees and managers of the Safety and Health program(s), as shown in Figure 6 for 2003. A difference of 1.0 or greater may indicate a difference in perception between Managers and Employees. WSTF Civil Service Managers did not participate in the FY-

03 survey; therefore, the Manager total average score is depicted for only six Centers.

- All Employee ratings at all seven Centers are above the 3.0 minimum acceptable level.
- All Manager ratings for the participating six Centers are above the 3.0 minimum acceptable level.
- Ratings at the seven Centers ranged from 3.2 to 4.6.
- The Employee and Manager ratings at each Center differed by less than 0.3, indicating close agreement in Employee and Manager perception agreement.

X. NASA Agency Civil Service Incident and Severity Rates, 5-years (figure 9)

Mishap Statistical Analysis

The true measure of the effectiveness of any Occupational Safety and Health Program is to analyze the program impact in terms of the reduction in the number of incidents that occur in the workplace and the severity of these incidents. The PEP survey system has the capability to perform this analysis. For the NASA Agency level analysis, the number of incidents and the severity of these incidents (as measured by the number of lost workdays per incident) were obtained from the Incident Reporting Information System (IRIS).

The analysis of the incident data required that it be converted into rates consistent with the OSHA standardized method of reporting such information. Each rate was computed using the equations:
(This method yields a rate that is standardized per 100 employees.)

$$\text{Incident Rate (Ri)} = \frac{\text{(No. of lost-time-incidents) X (200,000)}}{\text{Total Hours}}$$

$$\text{Severity Rate (Rs)} = \frac{\text{(No. of lost-time-incident days) X (200,000)}}{\text{Total Hours}}$$

The results of this conversion of data are shown in Figure 9.

- In FY-03, the incident rate exhibited an *unfavorable increase* of 77% in the number of lost-time-incidents per year since 2002.
- In FY-03, the severity rate exhibited an *unfavorable increase* of 80% in the number of lost-time-incident days per year since 2002.

XI. NASA Agency Civil Service PEP Equivalent Rates For Incident, Severity, and Sum Mishap Rates (figure 10)

The incident and severity data shown in Figure 9 were converted into a rating system equivalent to the PEP survey ratings to perform a comparative analysis. The PEP rating system uses a 1 - 5 numeric score with 5 being the highest rate possible. The conversion is based on the goal that a 10% reduction in the mishap rates should be realized each year. (This percentage is a variable with the default value of 10%, which is consistent with the ASI initiative and higher than the "Federal Worker 2000" initiative requirement of 3%.) Figure 10 illustrates the results of the conversions. The "PEP Sum Mishap Rating" is the average of the "PEP Incident Rating" and the "PEP Severity Rating." A high Sum Mishap rating indicates a reduction in the number of mishaps and their effects in the workplace.

- In FY-03, the PEP incident rate and severity rate *unfavorably decreased* since 2002.
- In FY-03, the Sum Mishap rate *unfavorably decreased* since 2002.

XII. NASA Agency Civil Service Employee and Manager PEP Survey Rates and PEP Equivalent Sum Mishap Rates Comparison (figure 11)

Average Rating for Civil Servant Employees and Managers

NASA has conducted the PEP Occupational Safety and Health Survey between 1999 through 2003 for each of the NASA Centers. The total average for all combined NASA centers are listed in the following table using a 1 to 5 scale:

Year	Employee	Manager
FY 1999	3.4	3.2
FY 2000	3.6	3.7
FY 2001	3.9	4.0
FY 2002	4.2	4.3
FY 2003	4.1	4.1

- In FY-03, the Agency-wide Employee average rates exhibited their first *unfavorable decrease* since 1999.
- In FY-03, the Agency-wide Manager average rates exhibited their first *unfavorable decrease* since 1999.

A comparison of the total average of the Employee and Manager PEP Survey ratings against the PEP Sum Mishap ratings from 1999 to 2003 is shown in Figure 11.

- An *unfavorable decrease* in Employee rating by 2% between 2002 and 2003 occurred.
- An *unfavorable decrease* in Manager rating by 5% between 2002 and 2003 occurred.
- In FY-03, the Sum Mishap rate *unfavorably decreased* since 2002.

XIII. NASA Agency Property Damage, 5-years (figure 12)

The property damage cost at NASA Centers from 1999 to 2003 is illustrated in Figure 12.

- In 2003, an *unfavorable increase* in property damage cost by $1,074,883,046.00 since 2002 was observed.
- In 2003, the cause of the spike was attributed to the below:

Center	Item	Cost
JSC	STS 107 Space Shuttle	$ 1,076,332,029.00

XIV. NASA Agency PEP Survey Report Recommendations

The PEP survey results for all NASA Centers were analyzed to ascertain the safety issues common to the Centers. The survey analysis also offers recommendations for areas that may benefit from additional emphasis across the entire agency. The following recommendations are based on ASI and OSHA guidelines reported by the PEP Analyzer Get Well Plan:

A. Management Leadership and Employee Participation

1. Managers should establish and communicate clear goals for the safety and health program and the objectives for meeting these goals.

2. Employers must encourage employee involvement in the structure and operations of the program and in the decisions that affect their safety and health. This includes participation in safety and health committees constituted in accordance with the National Labor Relations Act.

3. Management should establish clear policies for safety and health and communicate these policies to all employees.

4. Worksite analysis and inspection should include an examination and analysis of safety and health hazards associated with individual jobs. The results of these analyses and inspections should be included in employee training and hazard control programs.

5. Employees should assist in developing training requirements in their work area.

6. Employees should assist in developing training requirements in their work area.

B. Workplace Analysis

1. A job hazard analysis should be conducted on every job to ensure that all hazards are identified and any necessary controls are in place.

C. Mishap Record Analysis

1. Employee representatives should be a part of all inspections/investigations.

2. Agencies should maintain records of safety and health information as required by OSHA.

3. Employers should analyze injury and illness trends over time so that patterns with common causes can be identified and prevented.

4. Employers should analyze injury and illness trends over time so that patterns with common causes can be identified and prevented.

E. Hazard Prevention and Control

1. Site inspections and audits should include an assessment of hazard control adequacy.

2. The identification of health hazards and employee exposure levels should be accomplished through an industrial hygiene sampling rationale and strategy.

3. The identification of health hazards and employee exposure levels should be accomplished through an industrial hygiene sampling rationale and strategy.

4. Employers should prepare for emergencies and conduct training and drills as needed so that the response of all employees to emergencies will be "second nature."

5. Full compliance with all industry and OSHA ergonomic standards should be required in the workplace.

F. Emergency Response

1. Periodic re-evaluation of workplace emergency preparedness requirements should be carried out at least annually and after each significant incident.

G. Safety and Health Training

1.Training plan complexity depends on the size of the worksite, the nature of the hazards at the site, and the location of the site. Training plans should be updated to reflect the changes to the site resulting from growth, new equipment, new processes, etc

2. A formal orientation plan should be provided for all new hires. This plan should include, at a minimum, a discussion of hazards in the workplace, protective measures, emergency evacuation, and employee rights under the OSHA Act.

Figure 1.

PEP SURVEY RATING SYSTEM EXPLANATION

- RATINGS OF 1 - 5 CONSISTENT WITH PEP OCCUPATIONAL SAFETY SURVEY RATING SYSTEM
- DEFINITIONS
  - Level 1 - No program or ineffective program
  - Level 2 - Developmental program
  - Level 3 - Basic program. Represent minimal acceptable compliance level.
  - Level 4 - Superior program. Indicative of programs that have a planned strategy for continuous improvement and a goal of achieving an outstanding program level.
  - Level 5 - Outstanding program. Indicative of programs that are comprehensive and are successful in identifying and reducing program hazards.

Figure 2. PEP Scores vs. Program Effectiveness

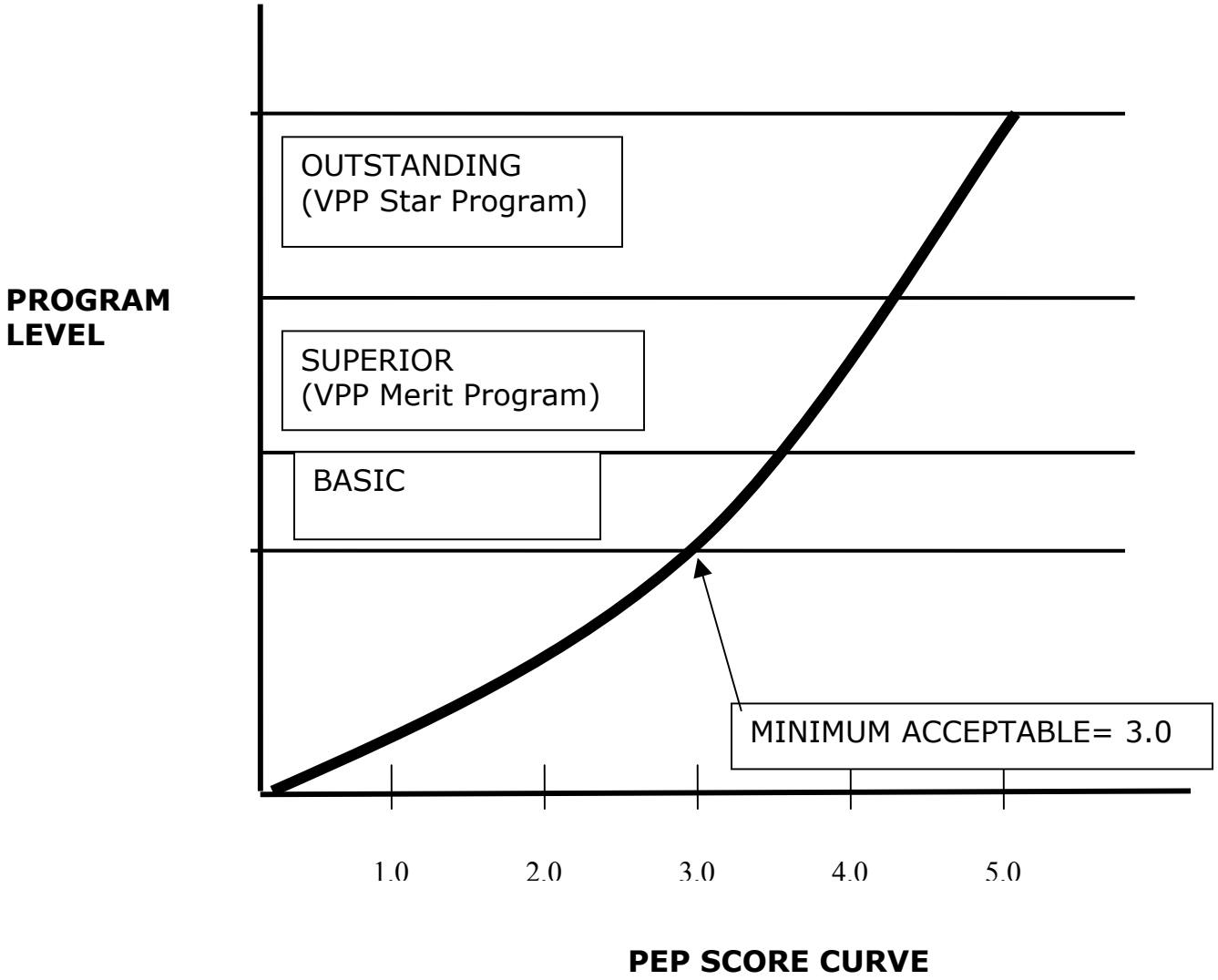
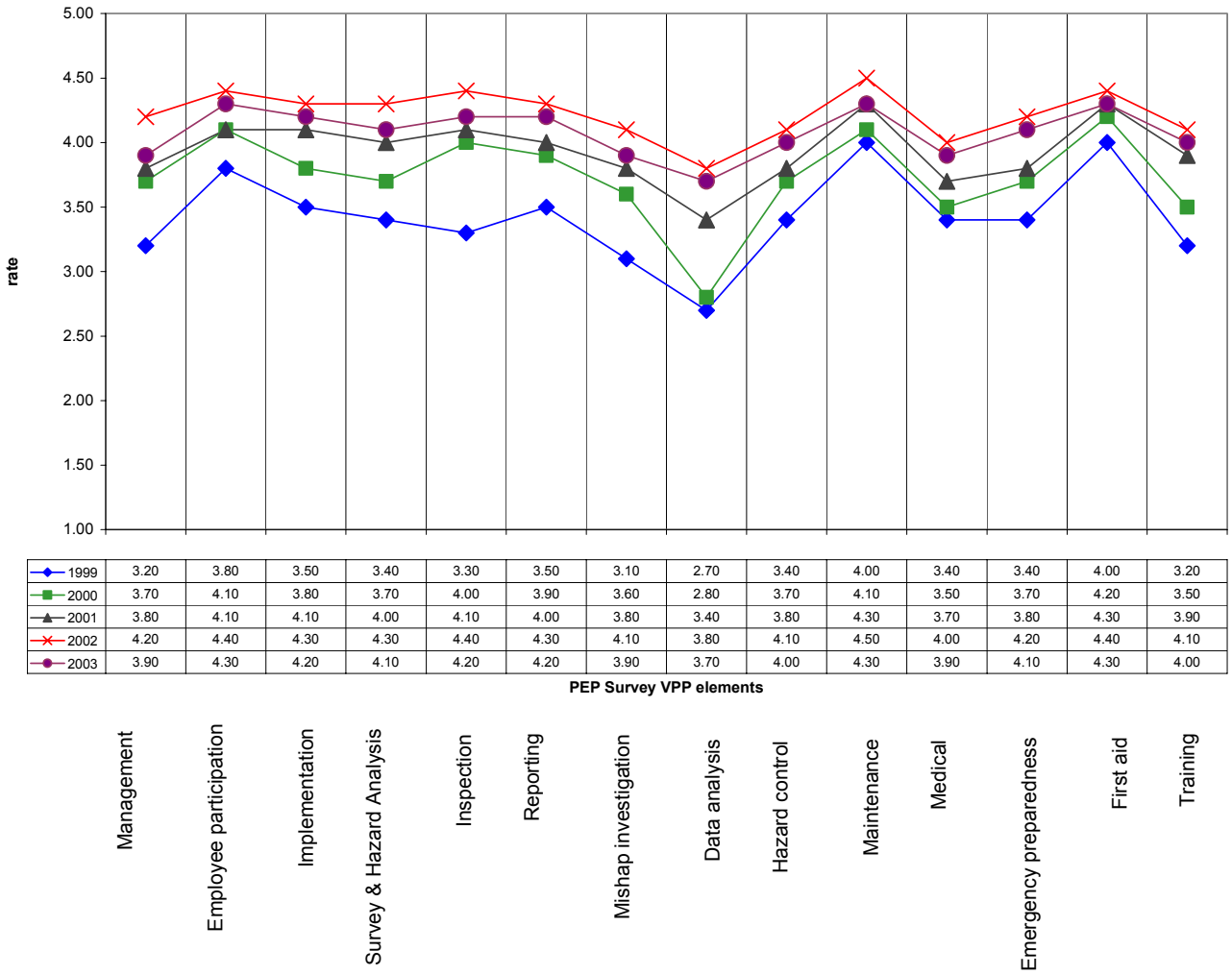


Figure 3. NASA Agency Civil Service Employee PEP Survey Rates For VPP Elements, Benchmark Comparative Analysis

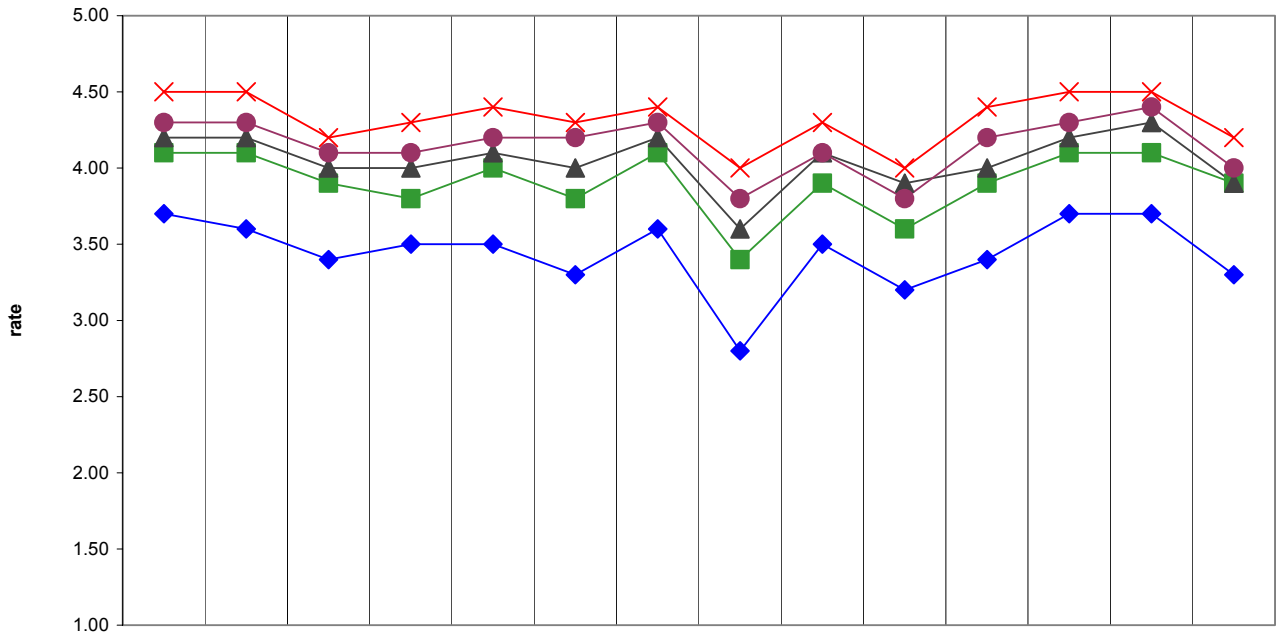
(Average score of the combined Centers for the elements since 1999)



	Management	Employee participation	Implementation	Survey & Hazard Analysis	Inspection	Reporting	Mishap investigation	Data analysis	Hazard control	Maintenance	Medical	Emergency preparedness	First aid	Training
1999	3.20	3.80	3.50	3.40	3.30	3.50	3.10	2.70	3.40	4.00	3.40	3.40	4.00	3.20
2000	3.70	4.10	3.80	3.70	4.00	3.90	3.60	2.80	3.70	4.10	3.50	3.70	4.20	3.50
2001	3.80	4.10	4.10	4.00	4.10	4.00	3.80	3.40	3.80	4.30	3.70	3.80	4.30	3.90
2002	4.20	4.40	4.30	4.30	4.40	4.30	4.10	3.80	4.10	4.50	4.00	4.20	4.40	4.10
2003	3.90	4.30	4.20	4.10	4.20	4.20	3.90	3.70	4.00	4.30	3.90	4.10	4.30	4.00

Figure 4. NASA Agency Civil Service Manager PEP Survey Rates For VPP Elements, Benchmark Comparative Analysis

(Combined Center rate averages for the elements since 1999)



	Management	Employee participation	Implementation	Survey & Hazard Analysis	Inspection	Reporting	Mishap investigation	Data analysis	Hazard control	Maintenance	Medical	Emergency preparedness	First aid	Training
1999	3.70	3.60	3.40	3.50	3.50	3.30	3.60	2.80	3.50	3.20	3.40	3.70	3.70	3.30
2000	4.10	4.10	3.90	3.80	4.00	3.80	4.10	3.40	3.90	3.60	3.90	4.10	4.10	3.90
2001	4.20	4.20	4.00	4.00	4.10	4.00	4.20	3.60	4.10	3.90	4.00	4.20	4.30	3.90
2002	4.50	4.50	4.20	4.30	4.40	4.30	4.40	4.00	4.30	4.00	4.40	4.50	4.50	4.20
2003	4.30	4.30	4.10	4.10	4.20	4.20	4.30	3.80	4.10	3.80	4.20	4.30	4.40	4.00

PEP Survey VPP elements

Figure 5. FY-03 NASA Agency Civil Service Employee and Manager PEP Survey Rates For VPP Elements, Comparison

(Combined Center rate averages for the elements)

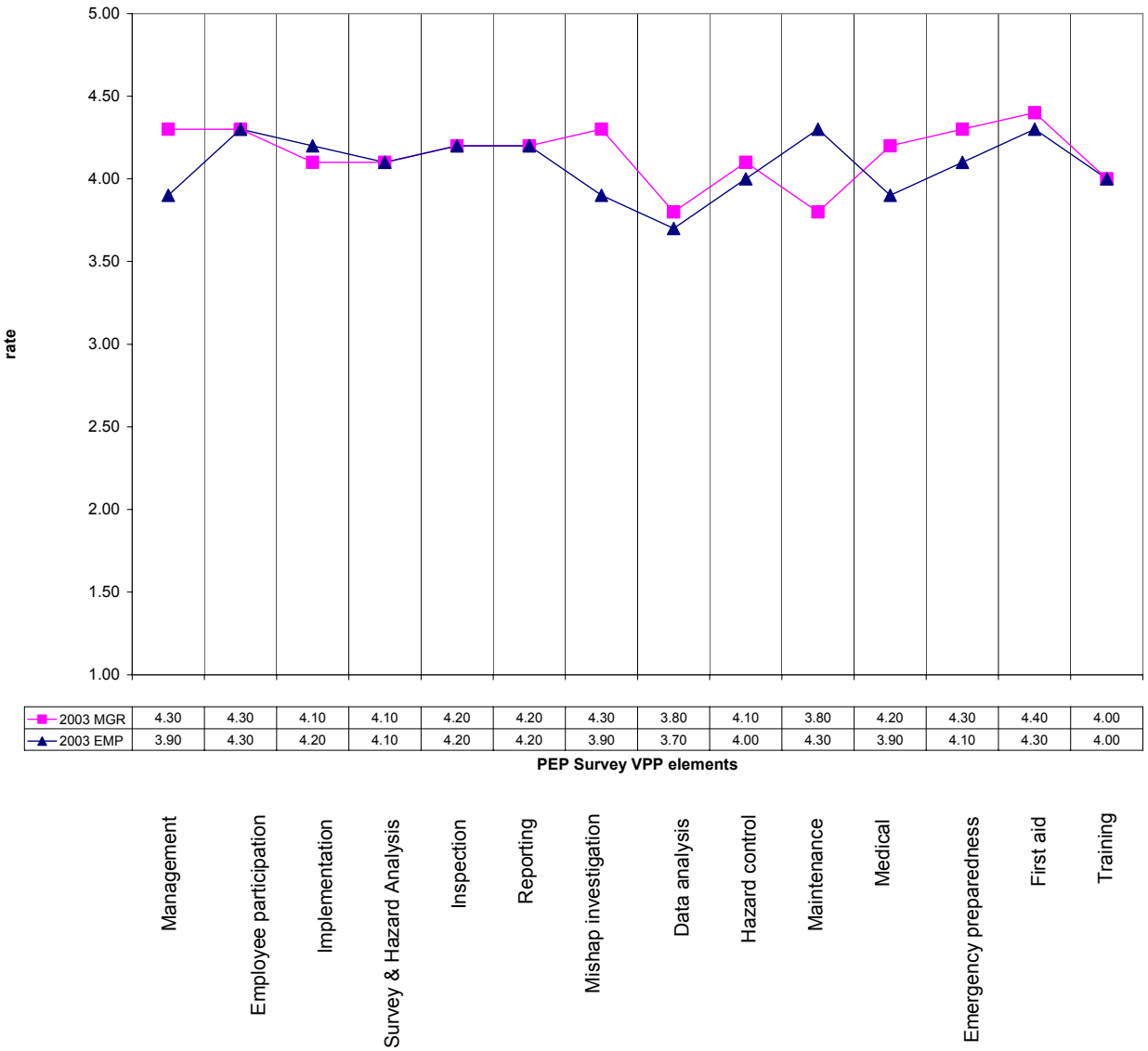
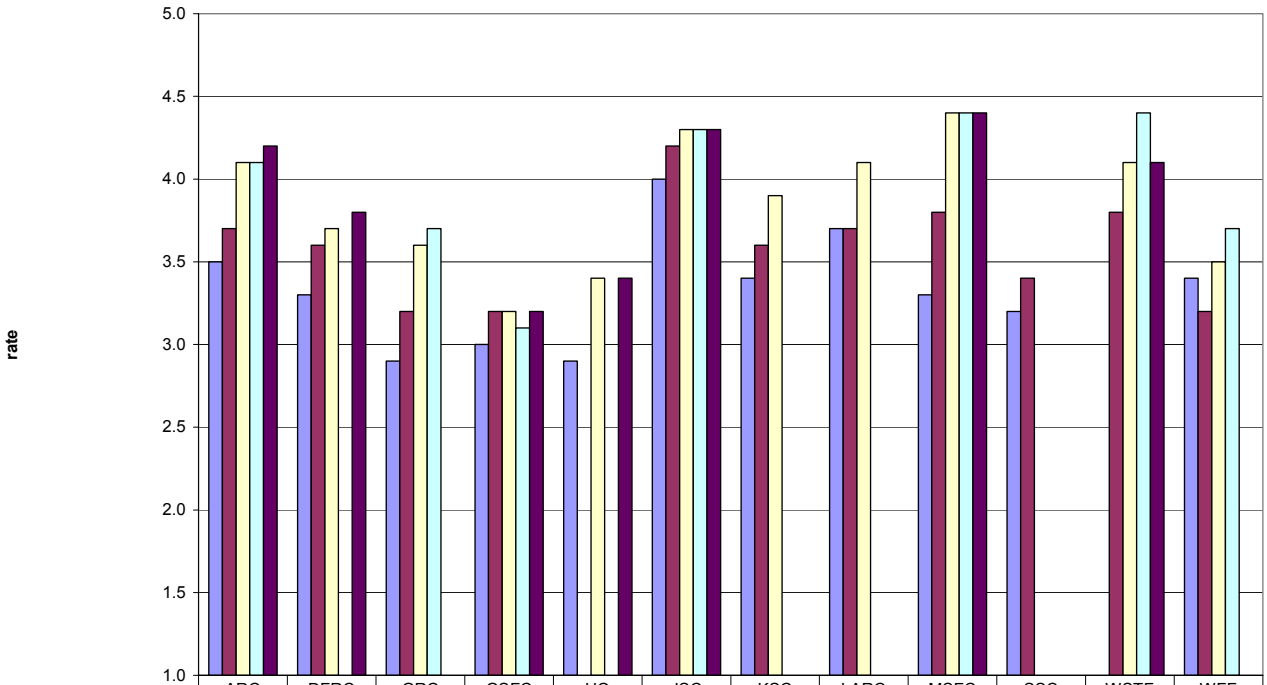


Figure 6. Civil Service Employee PEP Survey Rates For Each Reporting NASA Center, 5-years

(Center rate averages since 1999)

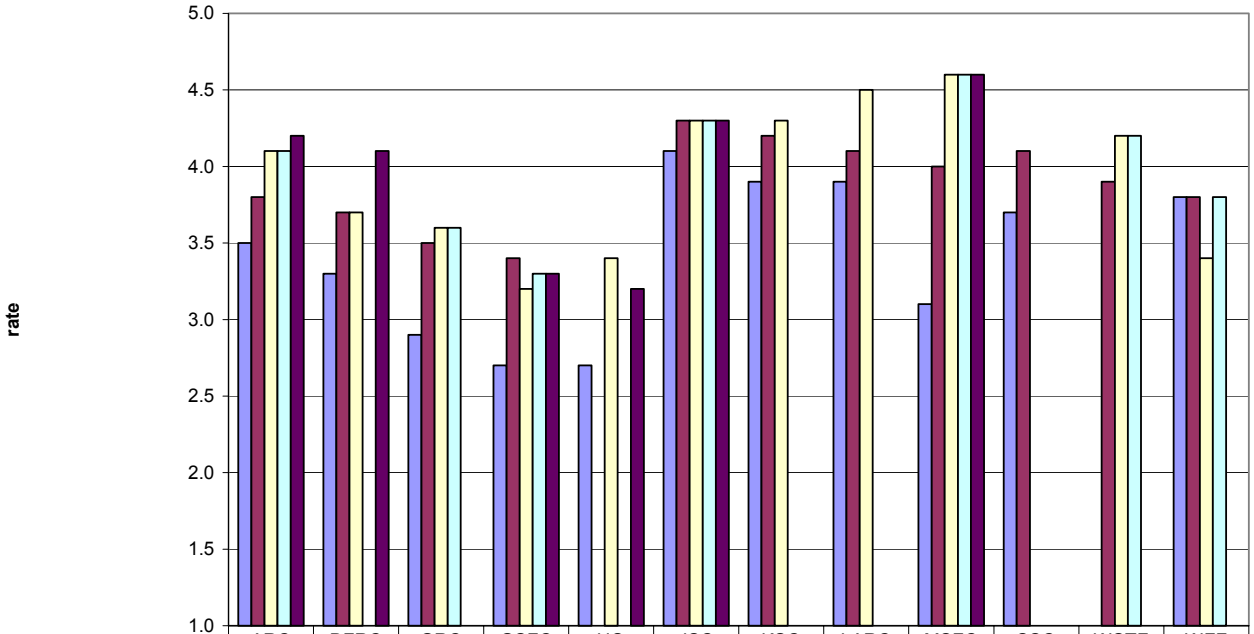


	ARC	DFRC	GRC	GSFC	HQ	JSC	KSC	LARC	MSFC	SSC	WSTF	WFF
1999 EMP RATING	3.5	3.3	2.9	3.0	2.9	4.0	3.4	3.7	3.3	3.2		3.4
2000 EMP RATING	3.7	3.6	3.2	3.2		4.2	3.6	3.7	3.8	3.4	3.8	3.2
2001 EMP RATING	4.1	3.7	3.6	3.2	3.4	4.3	3.9	4.1	4.4		4.1	3.5
2002 EMP RATING	4.1		3.7	3.1		4.3			4.4		4.4	3.7
2003 EMP Rating	4.2	3.8		3.2	3.4	4.3			4.4		4.1	

NASA Center

Figure 7. Civil Service Manager PEP Survey Rates For Each Reporting NASA Center, 5-years

(Center rate averages since 1999)

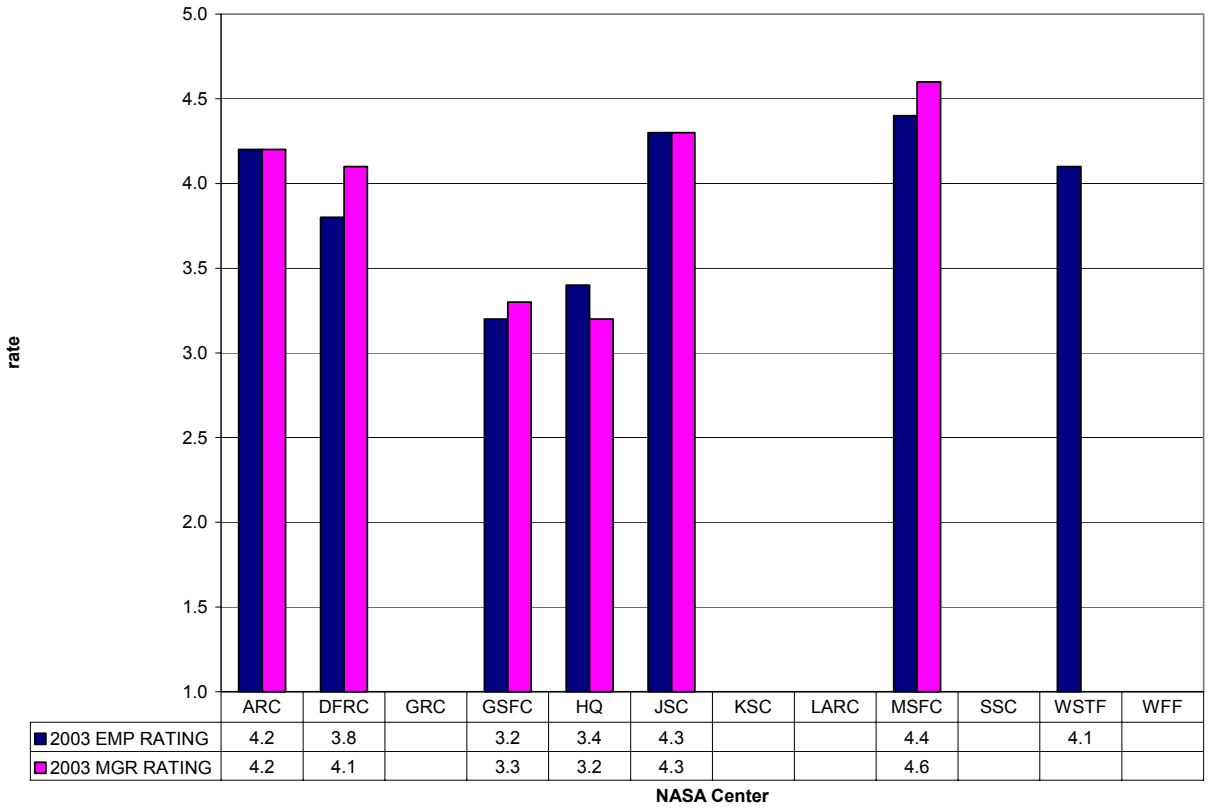


	ARC	DFRC	GRC	GSFC	HQ	JSC	KSC	LARC	MSFC	SSC	WSTF	WFF
1999 MGR RATING	3.5	3.3	2.9	2.7	2.7	4.1	3.9	3.9	3.1	3.7		3.8
2000 MGR RATING	3.8	3.7	3.5	3.4		4.3	4.2	4.1	4.0	4.1	3.9	3.8
2001 MGR RATING	4.1	3.7	3.6	3.2	3.4	4.3	4.3	4.5	4.6		4.2	3.4
2002 MGR RATING	4.1		3.6	3.3		4.3			4.6		4.2	3.8
2003 MGR RATING	4.2	4.1		3.3	3.2	4.3			4.6			

NASA Center

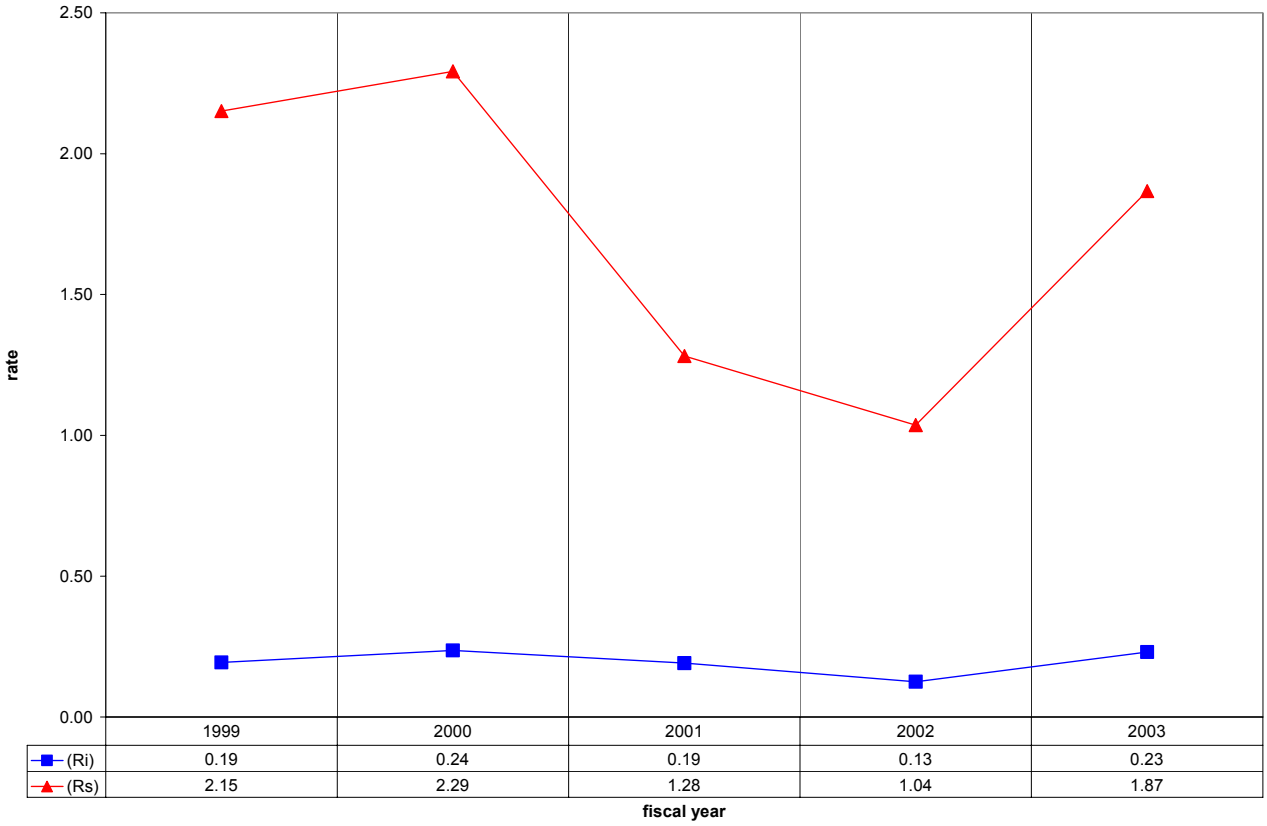
Figure 8. FY-03 Civil Service Employee and Manager PEP Survey Rates for Each Reporting NASA Center

(Center rate averages)



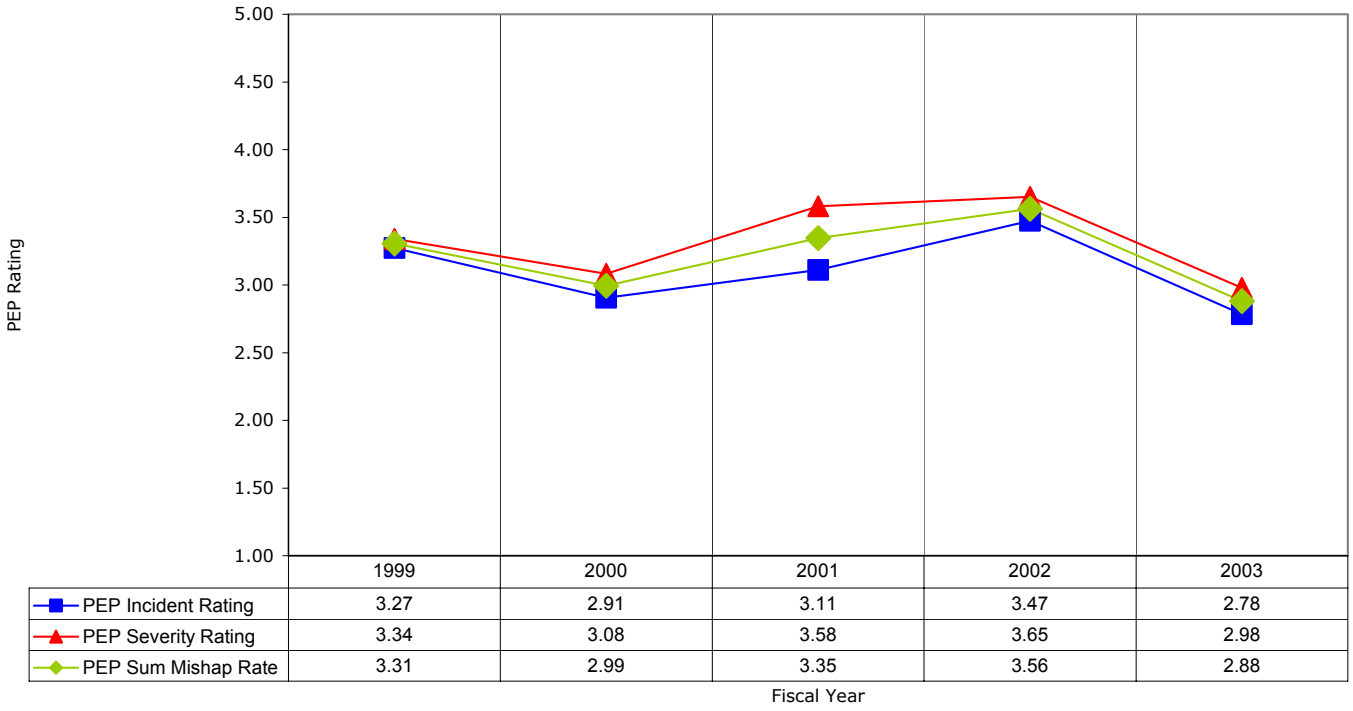
	ARC	DFRC	GRC	GSFC	HQ	JSC	KSC	LARC	MSFC	SSC	WSTF	WFF
2003 EMP RATING	4.2	3.8		3.2	3.4	4.3			4.4		4.1	
2003 MGR RATING	4.2	4.1		3.3	3.2	4.3			4.6			

Figure 9. NASA Agency Civil Service Incident and Severity Rates, 5-Year Comparison



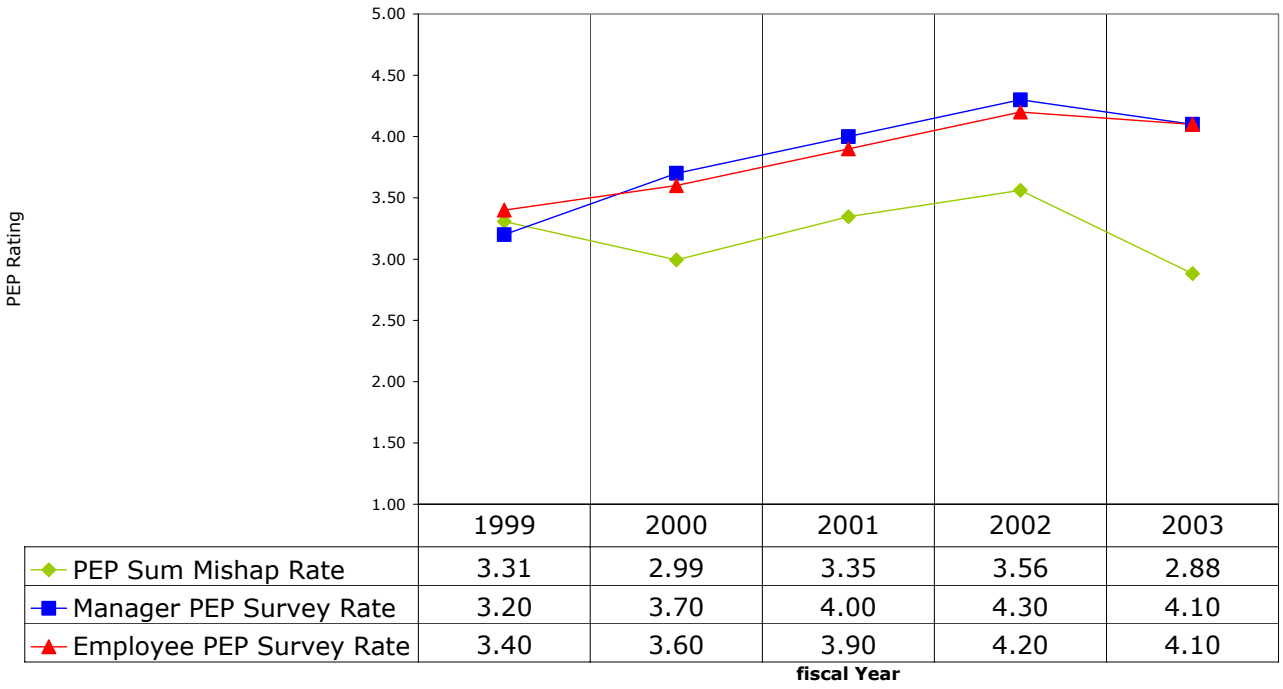
	1999	2000	2001	2002	2003
(Ri)	0.19	0.24	0.19	0.13	0.23
(Rs)	2.15	2.29	1.28	1.04	1.87

Figure 10. NASA Agency Civil Service PEP Equivalent Rates for Incident, Severity, and Sum Mishap



	1999	2000	2001	2002	2003
PEP Incident Rating	3.27	2.91	3.11	3.47	2.78
PEP Severity Rating	3.34	3.08	3.58	3.65	2.98
PEP Sum Mishap Rate	3.31	2.99	3.35	3.56	2.88

Figure 11. NASA Agency Civil Service Employee and Manager PEP Survey Rates and PEP Equivalent Sum Mishap Rates Comparison



	1999	2000	2001	2002	2003
PEP Sum Mishap Rate	3.31	2.99	3.35	3.56	2.88
Manager PEP Survey Rate	3.20	3.70	4.00	4.30	4.10
Employee PEP Survey Rate	3.40	3.60	3.90	4.20	4.10

Figure 12. NASA Agency Property Damage, 5-years